

North Dakota

Hard Red Spring Wheat

Variety Trial Results for 2017 and Selection Guide

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Hard red spring (HRS) wheat was harvested from 5.07 million acres in 2017, down from 2016. The average yield of spring wheat was 41 bushels/acre (bu/a), down 11 percent from last year. Drought significantly reduced yield in much of the state, with 280,000 acres of drought-damaged crop not harvested; much of it was baled for hay prior to harvest. Disease pressure was very low in the drought-affected regions of the state.

SY Ingmar was the most popular HRS wheat variety in 2017, occupying 17.8 percent of the planted acreage, followed by SY Soren (10.8), Linkert (6.9), Barlow (6.8), Elgin-ND (5.6) and SY Valda (5). SY Ingmar, SY Soren and SY Valda were released by Syngenta/AgriPro and Linkert was released by the University of Minnesota. Barlow and Elgin-ND are NDSU releases.

Successful wheat production depends on numerous factors, including selecting the right variety for a particular area. The information included in this publication is meant to aid in selecting that variety or group of varieties. Characteristics to consider in selecting a variety may include yield potential, protein content when grown with proper fertility, straw strength, plant height, response to problematic pests (diseases, insects, etc.) and maturity. Every growing season differs; therefore, when selecting a variety, we recommend using data that summarize several years and locations. Choose the variety that, on average, performs the best at multiple locations near your farm during several years.

Selecting varieties with good milling and baking quality also is important to maintain market recognition and avoid discounts. Hard red spring wheat from the northern Great Plains is known around the world for its excellent end-use quality.

Millers and bakers consider many factors in determining the quality and value of wheat they purchase. Several key parameters are: high test weight (for optimum milling yield and flour color), high falling number (greater than 300 seconds indicates minimal sprout damage), high protein content (the majority of HRS wheat export markets want at least 14 percent protein) and excellent protein quality (for superior bread-making quality as indicated by traditional strong gluten proteins, high baking absorption and large bread loaf volume).

Gluten strength, and milling and baking quality ratings are provided for individual varieties based on the results from the NDSU field plot variety trials. These ratings are applied to varieties grown for multiple years at seven NDSU Research Extension Centers across the state to provide producers and end users with end-use performance data. The wheat protein data often are higher than obtained in actual production fields but can be used to compare differences among varieties.

The agronomic data presented in this publication are from replicated research plots using experimental designs that enable the use of statistical analysis. These analyses enable the reader to determine, at a predetermined level of confidence, if the differences observed among varieties are reliable or if they might be due to error inherent in the experimental process.

The LSD (least significant difference) values beneath the columns in the tables are derived from these statistical analyses and apply only to the numbers in the column in which they appear. If the difference between two varieties exceeds the LSD value, it means that with 95 or 90 percent confidence (LSD probability 0.05 or 0.10), the higher-yielding variety has a significant yield advantage. When the difference between two varieties is less than the LSD value, no significant difference was found between those two varieties under those growing conditions.

NS is used to indicate no significant difference for that trait among any of the varieties at the 95 or 90 percent level of confidence. The CV stands for coefficient of variation and is expressed as a percentage. The CV is a measure of variability in the trial. Large CVs mean a large amount of variation that could not be attributed to differences in the varieties. Yield is reported at 13.5 percent moisture, while protein content is reported at 12 percent moisture content.

Presentation of data for the entries tested does not imply approval or endorsement by the authors or agencies conducting the test. North Dakota State University approves the reproduction of any table in the publication only if no portion is deleted, appropriate footnotes are given and the order of the data is not rearranged. Additional data from county sites are available from each Research Extension Center at www.ag.ndsu.edu/varietytrials/spring-wheat. Also consider using the online variety selection tool at www.ag.ndsu.edu/varietyselectiontool/, which allows you to generate tables of data from research locations nearest your farm and make head-to-head comparisons of varieties of interest.

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Table 1. North Dakota hard red spring wheat variety descriptions, agronomic traits, 2017.

| Variety | Agent or Origin ¹ | Year Released | Height (inches) | Straw Strength ² | Days to Head ³ | Reaction to Disease ⁴ | | | | | |
|------------------------------|-----------------------------------------|---------------|-----------------|-----------------------------|---------------------------|----------------------------------|-----------|-------------|-----------|------------|-----------|
| | | | | | | Stem Rust ⁵ | Leaf Rust | Stripe Rust | Tan Spot | Bact. Leaf | Head Scab |
| AKF-Astro⁶ | AFK | 2016 | 28 | NA | 60 | 4 | 2 | 2 | NA | 7 | 8 |
| Ambush | DynaGro | 2016 | 27 | 5 | 57 | 1 | 4 | 3 | NA | NA | 5 |
| Barlow | ND | 2009 | 29 | 6 | 57 | 1 | 6 | 4 | 6 | 7 | 5 |
| Bolles | MN | 2015 | 28 | 4 | 61 | 2 | 3 | 5 | 4 | 8 | 5 |
| Boost | SD | 2016 | 29 | 5 | 61 | 1 | 4 | 3 | NA | 5 | 4 |
| Caliber | DynaGro | 2016 | 23 | 2 | 61 | 1 | 2 | 5 | NA | NA | 8 |
| Elgin-ND | ND | 2012 | 30 | 5 | 60 | 1 | 6 | 5 | 6 | 7 | 5 |
| Faller | ND | 2007 | 28 | 5 | 61 | 1 | 7 | 8 | 7 | 8 | 5 |
| Glenn | ND | 2005 | 29 | 4 | 56 | 1 | 6 | 4 | 6 | 7 | 3 |
| HRS 3100 | Croplan | 2016 | 26 | 4 | 60 | 1 | 4 | 6 | NA | 7 | 6 |
| HRS 3419 | Croplan | 2014 | 28 | 2 | 63 | 1 | 3 | 4 | NA | 6 | 5 |
| HRS 3504 | Croplan | 2015 | 25 | 3 | 61 | 1 | 1 | 6 | NA | 6 | 7 |
| HRS 3530 | Croplan | 2015 | 29 | 4 | 61 | 1 | 2 | 8 | NA | 7 | 5 |
| HRS 3616 | Croplan | 2016 | 27 | 4 | 59 | 1 | 5 | 5 | NA | 8 | 7 |
| Lang-MN | MN | 2017 | 28 | 3 | 61 | 1 | 2 | 1 | NA | 6 | 5 |
| LCS Anchor | Limagrain | 2016 | 24 | 3 | 57 | 1 | 2 | 4 | NA | 7 | 6 |
| LCS Breakaway | Limagrain | 2011 | 25 | 5 | 57 | 1 | 3 | 6 | 4 | 7 | 5 |
| LCS Nitro | Limagrain | 2015 | 26 | 4 | 62 | 2 | 2 | 2 | 3 | 5 | 5 |
| LCS Prime | Limagrain | 2015 | 28 | 4 | 57 | 2 | 4 | 6 | NA | 8 | 4 |
| LCS Rebel | Limagrain | 2017 | 29 | 5 | 57 | 1 | 7 | 4 | NA | 7 | 4 |
| LCS Trigger | Limagrain | 2016 | 28 | 5 | 65 | 1 | 1 | 2 | NA | 6 | 4 |
| Linkert | MN | 2013 | 24 | 2 | 58 | 1 | 3 | 1 | 4 | 5 | 5 |
| Mott ⁷ | ND | 2009 | 30 | 3 | 62 | 1 | 6 | 6 | 6 | 7 | 6 |
| MS Camaro | Meridian | 2016 | 25 | 5 | 59 | 1 | 1 | 2 | NA | 6 | 6 |
| MS Chevelle | Meridian | 2014 | 26 | 5 | 57 | 1 | 4 | 3 | 6 | 6 | 5 |
| ND VitPro | ND | 2016 | 27 | 3 | 58 | 1 | 4 | 3 | NA | 7 | 4 |
| Prevail | SD | 2014 | 26 | 4 | 57 | 4 | 3 | 1 | 4 | 4 | 5 |
| Prosper | ND | 2011 | 28 | 5 | 61 | 1 | 6 | 8 | 6 | 7 | 5 |
| Rollag | MN | 2011 | 26 | 3 | 58 | 1 | 4 | 2 | 3 | 7 | 3 |
| Shelly | MN | 2016 | 25 | 5 | 62 | 2 | 6 | 5 | NA | 6 | 5 |
| Surpass | SD | 2016 | 26 | 5 | 55 | 1 | 4 | 6 | NA | 7 | 5 |
| SY Ingmar | Syngenta/AgriPro | 2014 | 26 | 3 | 60 | 1 | 3 | 6 | 6 | 6 | 5 |
| SY Rowyn | Syngenta/AgriPro | 2013 | 25 | 4 | 58 | 1 | 3 | 4 | 2 | 5 | 5 |
| SY Soren | Syngenta/AgriPro | 2011 | 25 | 3 | 59 | 1 | 2 | 7 | 2 | 6 | 5 |
| SY Valda | Syngenta/AgriPro | 2015 | 26 | 4 | 58 | 1 | 2 | 7 | 6 | 7 | 4 |
| TCG-Climax | 21st Century Genetics | 2017 | 28 | 2 | 64 | 1 | 6 | 3 | NA | 7 | 6 |
| TCG-Cornerstone | 21 st Century Genetics | 2015 | 27 | 4 | 59 | 1 | 4 | 6 | NA | NA | 6 |
| TCG-Spitfire | 21 st Century Genetics | 2015 | 28 | 4 | 62 | 1 | 5 | 4 | NA | 6 | 6 |
| WB9479 | WestBred | 2017 | 24 | 4 | 58 | 1 | 1 | 1 | NA | 8 | 6 |
| WB9590 | WestBred | 2017 | 24 | NA | 57 | 1 | 3 | 8 | 3 | 7 | 6 |
| WB9653 | WestBred | 2015 | 26 | 4 | 59 | 2 | 3 | 8 | 6 | 7 | 6 |
| WB9719 | WestBred | 2017 | 26 | NA | 59 | 1 | 4 | 2 | NA | NA | 6 |
| WB-Mayville | WestBred | 2011 | 25 | 3 | 57 | 1 | 3 | 6 | 6 | 8 | 8 |

¹Refers to agent or developer: MN = University of Minnesota; ND = North Dakota State University; SD = South Dakota State University; **Bold** varieties are those recently released, so data is limited and rating values may change.

²Straw Strength = 1 to 9 scale, with 1 the strongest and 9 the weakest. These values are based on recent data and may change as more data become available.

³Days to Head = the number of days from planting to head emergence from the boot averaged from several locations.

⁴Disease reactions scores from 1-9, with 1 = resistant and 9 = very susceptible, NA = not available.

⁵Fargo stem rust nursery inoculated with *Puccinia graminis* f. sp. *tritici* races TPMK, TMLK, RTQQ, QFCQ and QTHJ.

⁶White wheat.

⁷Solid stemmed or semisolid stem, imparting resistance to sawfly.

Table 2. Analytical milling and baking data from field plot variety trials at Carrington, Casselton, Dickinson, Hettinger, Langdon, Minot and Williston in 2015 and 2016 (unless otherwise noted)¹.

| Variety | Planted 2017 | | Test Weight (lb/bu) | Protein 12% MB (%) | Vitreous Kernels (%) | 1,000 Kwt (gram) | Falling Number (seconds) | Farinograph Stability (minutes) | Farinograph | | Qual. # (mm) | DO (1-10) | Loaf Volume (cc) |
|-----------------------|--------------|------------------|---------------------|--------------------|----------------------|------------------|--------------------------|---------------------------------|----------------|----------|--------------|-----------|------------------|
| | ND (% area) | OBS ² | | | | | | | Absorption (%) | MTI (bu) | | | |
| Barlow | 6.8 | 10 | 62.3 | 14.4 | 89 | 32.1 | 389 | 12.1 | 64.3 | 29 | 153 | 9 | 993 |
| Bolles | 3.3 | 10 | 61.1 | 15.2 | 83 | 33.9 | 425 | 19.8 | 62.5 | 17 | 234 | 9 | 1,007 |
| Boost | -- | 10 | 61.0 | 14.0 | 74 | 33.3 | 422 | 8.4 | 62.9 | 33 | 113 | 8 | 998 |
| Duclair | -- | 8 | 59.5 | 13.7 | 50 | 32.7 | 384 | 15.3 | 59.1 | 24 | 188 | 9 | 978 |
| Elgin-ND ³ | 5.6 | 10 | 61.0 | 14.2 | 79 | 30.9 | 410 | 9.0 | 63.3 | 30 | 121 | 9 | 969 |
| Faller ³ | 3.8 | 10 | 60.8 | 13.3 | 69 | 35.1 | 400 | 9.0 | 61.8 | 30 | 105 | 9 | 942 |
| Focus | -- | 9 | 62.1 | 14.0 | 73 | 32.1 | 415 | 8.6 | 59.8 | 32 | 118 | 9 | 963 |
| Glenn ³ | 4.9 | 10 | 64.1 | 14.8 | 92 | 32.8 | 387 | 14.9 | 63.3 | 21 | 178 | 9 | 1,001 |
| HRS 3419 | -- | 8 | 60.4 | 13.2 | 57 | 30.3 | 423 | 12.6 | 59.8 | 27 | 155 | 9 | 907 |
| HRS 3530 | -- | 8 | 61.3 | 14.0 | 68 | 34.6 | 405 | 8.0 | 63.2 | 32 | 102 | 8 | 981 |
| Lang-MN | -- | 10 | 62.7 | 14.1 | 90 | 31.8 | 418 | 7.7 | 62.5 | 34 | 98 | 9 | 964 |
| LCS Nitro | -- | 5 | 59.8 | 13.1 | 36 | 33.4 | 437 | 16.7 | 58.2 | 21 | 183 | 9 | 908 |
| LCS Prime | -- | 7 | 62.9 | 12.8 | 59 | 35.4 | 383 | 12.2 | 61.4 | 27 | 130 | 9 | 936 |
| Linkert ³ | 6.9 | 10 | 61.4 | 14.7 | 70 | 35.3 | 428 | 25.0 | 61.9 | 15 | 270 | 9 | 991 |
| Mott | 1.1 | 8 | 61.5 | 14.2 | 71 | 29.3 | 386 | 10.2 | 61.0 | 30 | 125 | 9 | 959 |
| ND VitPro | -- | 10 | 63.4 | 14.6 | 93 | 33.8 | 407 | 8.4 | 62.9 | 31 | 114 | 10 | 979 |
| Prevail | -- | 10 | 60.9 | 13.4 | 51 | 33.3 | 390 | 9.9 | 59.3 | 32 | 112 | 9 | 934 |
| Prosper ³ | 4.5 | 10 | 60.7 | 13.5 | 64 | 35.0 | 398 | 10.0 | 60.8 | 30 | 111 | 9 | 968 |
| Rollag | 2.9 | 10 | 62.0 | 14.4 | 70 | 33.7 | 485 | 7.6 | 64.7 | 28 | 109 | 9 | 883 |
| Shelly | -- | 10 | 62.4 | 13.1 | 69 | 33.6 | 425 | 10.9 | 59.3 | 26 | 118 | 9 | 905 |
| Surpass | -- | 10 | 61.5 | 13.7 | 52 | 30.2 | 381 | 9.4 | 59.0 | 30 | 118 | 9 | 976 |
| SY Ingmar | 17.8 | 10 | 62.0 | 14.2 | 79 | 30.2 | 414 | 11.1 | 61.0 | 25 | 136 | 9 | 1,009 |
| SY Rowyn | 1.0 | 11 | 61.3 | 13.0 | 49 | 31.1 | 422 | 16.1 | 59.4 | 21 | 176 | 9 | 944 |
| SY Soren | 10.8 | 10 | 61.9 | 14.3 | 66 | 30.2 | 443 | 11.6 | 61.3 | 26 | 155 | 9 | 963 |
| SY Valda | 5.0 | 10 | 61.3 | 13.3 | 85 | 32.8 | 394 | 7.0 | 60.6 | 36 | 100 | 9 | 872 |
| WB 9653 | -- | 5 | 60.4 | 13.2 | 69 | 32.0 | 384 | 8.7 | 61.5 | 29 | 115 | 8 | 881 |
| WB-Mayville | 3.1 | 10 | 61.1 | 14.2 | 74 | 34.2 | 430 | 13.5 | 62.2 | 26 | 162 | 9 | 938 |
| Average | | | 61.5 | 13.9 | 70 | 32.7 | 410 | 11.6 | 61.4 | 27 | 141 | 9 | 954 |

Analyses conducted at the NDSU Hard Red Spring Wheat Quality Laboratory in Fargo, N.D.

¹2016 Carrington and Dickinson data omitted.

²Observations (number of times tested).

³Lines used as checks.

Table 3. Yield of hard red spring wheat varieties grown at five locations in eastern North Dakota, 2015-2017.

| Variety | Colgate | | Carrington | | Casselton | | Langdon | | Prosper | | Avg. eastern N.D. | |
|-----------------|-------------------|------|------------|-------|-----------|------|---------|------|---------|------|-------------------|--|
| | 2017 | 2017 | 3 Yr. | 2017 | 3 Yr. | 2017 | 3 Yr. | 2017 | 3 Yr. | 2017 | 3 Yr. | |
| | ------(bu/a)----- | | | | | | | | | | | |
| AKF-Astro | 65.3 | 55.6 | -- | 101.7 | -- | 56.1 | -- | 79.7 | -- | 71.7 | -- | |
| Ambush | 64.4 | 59.7 | -- | 86.5 | -- | 71.6 | -- | 77.5 | -- | 71.9 | -- | |
| Barlow | 66.2 | 57.1 | 49.5 | 91.5 | 78.4 | 74.3 | 69.1 | 78.9 | 71.9 | 73.6 | 67.2 | |
| Bolles | 66.3 | 60.0 | 46.2 | 97.8 | 77.3 | 74.1 | 69.9 | 74.8 | 67.1 | 74.6 | 65.1 | |
| Boost | 68.4 | 58.4 | 49.6 | 88.2 | -- | 78.9 | 70.5 | 79.4 | -- | 74.7 | -- | |
| Caliber | 65.7 | 54.7 | -- | 84.6 | -- | 63.1 | -- | 74.4 | -- | 68.5 | -- | |
| Elgin-ND | 68.1 | 57.7 | 51.1 | 91.3 | 77.9 | 81.4 | 73.0 | 81.5 | 70.9 | 76.0 | 68.2 | |
| Faller | 64.1 | 58.6 | 48.3 | 94.6 | 75.7 | 82.2 | 78.4 | 92.0 | 74.2 | 78.3 | 69.2 | |
| Glenn | 65.8 | 56.5 | 48.6 | 88.4 | 71.4 | 71.1 | 70.1 | 70.6 | 67.5 | 70.5 | 64.4 | |
| HRS 3100 | 65.3 | 59.3 | -- | 100.3 | -- | 75.3 | -- | 88.6 | -- | 77.8 | -- | |
| HRS 3419 | 59.6 | 58.7 | 48.6 | 103.8 | -- | 92.4 | 84.7 | 73.7 | -- | 77.6 | -- | |
| HRS 3504 | 59.5 | 61.2 | -- | 100.0 | -- | 76.8 | 75.1 | 90.1 | -- | 77.5 | -- | |
| HRS 3530 | 66.2 | 57.9 | 48.2 | 97.1 | -- | 78.9 | 78.0 | 85.6 | -- | 77.1 | -- | |
| HRS 3616 | 63.3 | 61.1 | -- | 97.3 | -- | 75.6 | -- | 74.2 | -- | 74.3 | -- | |
| Lang-MN | 67.3 | 58.8 | 50.6 | 93.0 | -- | 77.6 | -- | 81.5 | -- | 75.6 | -- | |
| LCS Anchor | 62.7 | 51.5 | -- | 91.9 | -- | 69.0 | -- | 74.8 | -- | 70.0 | -- | |
| LCS Breakaway | 63.4 | 50.4 | 47.2 | 92.3 | 78.9 | 75.4 | 73.3 | 84.9 | 75.3 | 73.3 | 68.7 | |
| LCS Nitro | 65.6 | 57.2 | 47.2 | 95.9 | 79.0 | 92.4 | 81.7 | 65.6 | 69.4 | 75.3 | 69.3 | |
| LCS Prime | 65.7 | 60.8 | -- | 100.5 | -- | 87.5 | 78.1 | 91.3 | -- | 81.2 | -- | |
| LCS Rebel | 66.0 | 57.1 | -- | 97.7 | -- | 84.2 | -- | 89.0 | -- | 78.8 | -- | |
| LCS Trigger | 64.1 | 63.6 | -- | 115.2 | -- | 98.3 | -- | 98.8 | -- | 88.0 | -- | |
| Linkert | 61.4 | 57.0 | 49.5 | 88.0 | 76.3 | 63.8 | 67.6 | 76.5 | 72.9 | 69.3 | 66.6 | |
| Mott | 67.7 | 58.6 | 50.8 | 97.8 | -- | -- | -- | 76.1 | -- | -- | -- | |
| MS Camaro | 62.3 | 53.0 | -- | 85.4 | -- | 66.6 | -- | 74.7 | -- | 68.4 | -- | |
| MS Chevelle | 66.0 | 60.5 | 50.6 | 98.2 | 78.5 | 86.2 | 78.0 | 85.6 | 76.9 | 79.3 | 71.0 | |
| ND VitPro | 66.7 | 56.4 | 48.9 | 88.8 | 73.1 | 71.6 | 69.3 | 68.5 | 68.9 | 70.4 | -- | |
| Prevail | 67.1 | 62.4 | 52.5 | 93.8 | 83.5 | 76.0 | 71.8 | 87.7 | 82.8 | 77.4 | 72.7 | |
| Prosper | 66.6 | 63.1 | 49.3 | 97.5 | 78.4 | 82.5 | 77.0 | 88.4 | 72.1 | 79.6 | 69.2 | |
| Rollag | 61.0 | 58.6 | 50.6 | 89.6 | 81.3 | 75.7 | 74.0 | 82.8 | 74.1 | 73.5 | 70.0 | |
| Shelly | 66.7 | 66.3 | 51.5 | 101.1 | -- | 81.4 | 77.4 | 93.6 | -- | 81.8 | -- | |
| Surpass | 57.3 | 60.6 | 51.4 | 99.8 | -- | 80.2 | 72.4 | 93.5 | -- | 78.3 | -- | |
| SY Ingmar | 54.2 | 57.0 | 50.9 | 93.6 | 81.7 | 74.0 | 72.7 | 83.4 | 73.9 | 72.4 | 69.8 | |
| SY Rowyn | 61.0 | 55.7 | 50.6 | 87.3 | 79.0 | 85.6 | 76.8 | 81.0 | 75.4 | 74.1 | 70.5 | |
| SY Soren | 69.4 | 60.0 | 48.5 | 92.5 | 75.6 | 75.9 | 72.9 | 84.7 | 70.5 | 76.5 | 66.9 | |
| SY Valda | 55.3 | 66.9 | 52.4 | 100.3 | 86.1 | 84.5 | 80.7 | 99.1 | 85.4 | 81.2 | 76.2 | |
| TCG-Climax | 60.7 | 63.0 | -- | 84.6 | -- | 71.9 | -- | 71.5 | -- | 70.3 | -- | |
| TCG-Cornerstone | 61.6 | 55.2 | -- | 89.2 | -- | 63.7 | -- | 85.3 | -- | 71.0 | -- | |
| TCG-Spitfire | 61.3 | 66.3 | -- | 96.7 | -- | 76.2 | -- | 85.6 | -- | 77.2 | -- | |
| WB9479 | 63.6 | 57.5 | -- | 98.6 | -- | 75.4 | -- | 80.5 | -- | 75.1 | -- | |
| WB9590 | 59.3 | 63.4 | -- | 94.2 | -- | 72.1 | -- | 83.2 | -- | 74.4 | -- | |
| WB9653 | 66.7 | 64.9 | 56.6 | 103.8 | -- | 82.7 | 77.5 | 90.8 | -- | 81.8 | -- | |
| WB9719 | 65.5 | 58.6 | -- | 89.6 | -- | 69.5 | -- | 91.5 | -- | 74.9 | -- | |
| WB-Mayville | 65.9 | 54.9 | 47.7 | 89.4 | 75.8 | 57.5 | 60.1 | 81.9 | 72.9 | 69.9 | 64.1 | |
| Mean | 64.0 | 58.5 | 49.9 | 93.5 | 78.5 | 76.2 | 74.2 | 81.5 | 73.7 | 74.7 | 68.8 | |
| CV% | 6.7 | 7.2 | -- | 4.8 | -- | 5.9 | -- | 5.9 | -- | 7.3 | -- | |
| LSD 0.05 | 4.9 | 5.8 | -- | 6.1 | -- | 6.3 | -- | 6.6 | -- | 6.9 | -- | |
| LSD 0.10 | 4.1 | 4.9 | -- | 4.8 | -- | 5.3 | -- | 5.1 | -- | 5.7 | -- | |

Table 4. Yield of hard red spring wheat varieties grown at four locations in western North Dakota, 2015-2017.

| Variety | <u>Dickinson</u> | | <u>Hettinger</u> | | <u>Minot</u> | | <u>Williston</u> | | <u>Avg. western N.D.</u> | |
|-----------------|-------------------|-------|------------------|-------|--------------|-------|------------------|-------|--------------------------|-------|
| | 2017 | 3 Yr. | 2017 | 3 Yr. | 2017 | 3 Yr. | 2017 | 3 Yr. | 2017 | 3 Yr. |
| | ------(bu/a)----- | | | | | | | | | |
| AKF-Astro | 37.6 | -- | 37.9 | -- | 56.6 | -- | 25.2 | -- | 39.3 | -- |
| Ambush | 34.1 | -- | 36.3 | -- | 48.1 | -- | 26.6 | -- | 36.3 | -- |
| Barlow | 38.1 | 51.9 | 40.1 | 51.2 | 48.2 | 60.1 | 28.0 | 35.7 | 38.6 | 49.7 |
| Bolles | 34.4 | 50.2 | 32.8 | 49.1 | 48.6 | 62.5 | 25.7 | 34.9 | 35.4 | 49.2 |
| Boost | 34.7 | 51.2 | 31.2 | 50.8 | 49.3 | 61.5 | 29.2 | 36.9 | 36.1 | 50.1 |
| Caliber | 31.6 | -- | 32.5 | -- | 48.0 | -- | 29.0 | -- | 35.3 | -- |
| Elgin-ND | 36.2 | -- | 38.4 | 53.8 | 50.8 | 67.8 | 28.7 | 38.9 | 38.5 | -- |
| Faller | 34.5 | 49.9 | 41.5 | 54.8 | 49.9 | 72.2 | 25.1 | 34.4 | 37.8 | 52.8 |
| Glenn | 34.9 | 51.3 | 32.1 | 48.1 | 50.6 | 65.0 | 29.3 | 36.8 | 36.7 | 50.3 |
| HRS 3100 | 34.3 | -- | 36.3 | -- | 38.9 | -- | 29.4 | -- | 34.7 | -- |
| HRS 3419 | 30.7 | 55.9 | 41.2 | 60.9 | 53.4 | 73.1 | 24.9 | -- | 37.6 | -- |
| HRS 3504 | 34.8 | -- | 32.7 | -- | 43.6 | 67.1 | 30.8 | -- | 35.5 | -- |
| HRS 3530 | 33.1 | 54.8 | 35.9 | 53.1 | 51.3 | 71.7 | 27.7 | -- | 37.0 | -- |
| HRS 3616 | 32.7 | -- | 38.7 | -- | 48.3 | -- | 29.0 | -- | 37.2 | -- |
| Lang-MN | 35.7 | -- | 36.3 | -- | 46.9 | -- | 27.5 | -- | 36.6 | -- |
| LCS Anchor | 34.3 | -- | 35.7 | -- | 34.6 | -- | 31.9 | -- | 34.1 | -- |
| LCS Breakaway | 32.7 | 53.8 | 34.8 | 49.1 | 34.9 | 64.0 | 28.4 | 35.0 | 32.7 | 50.5 |
| LCS Nitro | 32.8 | 58.3 | 35.4 | 54.3 | 49.0 | 80.5 | 28.6 | 37.7 | 36.5 | 57.7 |
| LCS Prime | 36.2 | -- | 39.2 | 56.2 | 44.7 | 64.9 | 28.6 | 43.4 | 37.2 | -- |
| LCS Rebel | 33.3 | -- | 36.8 | -- | 46.8 | -- | 27.6 | -- | 36.1 | -- |
| LCS Trigger | 34.0 | -- | 44.5 | -- | 49.2 | -- | 21.3 | -- | 37.3 | -- |
| Linkert | 32.8 | 52.3 | 34.0 | 47.1 | 39.2 | 61.8 | 27.5 | 37.2 | 33.4 | 49.6 |
| Mott | 29.8 | 46.3 | 36.6 | 49.8 | 42.9 | 62.6 | 21.9 | 37.0 | 32.8 | 48.9 |
| MS Camaro | 33.5 | -- | 31.4 | -- | 46.9 | -- | 30.3 | -- | 35.5 | -- |
| MS Chevelle | 35.3 | 56.3 | 37.5 | 53.8 | 45.2 | 66.9 | 29.4 | 40.8 | 36.9 | 54.5 |
| ND VitPro | 28.8 | 50.5 | 31.9 | 48.0 | 35.2 | 61.1 | 27.8 | 55.6 | 30.9 | -- |
| Prevail | 38.4 | 49.8 | 38.3 | 54.3 | 48.9 | 63.2 | 30.3 | 41.2 | 39.0 | 52.1 |
| Prosper | 33.6 | 53.2 | 39.5 | 48.6 | 55.4 | 76.0 | 25.0 | 36.0 | 38.4 | 53.5 |
| Rollag | 37.1 | 55.0 | 31.6 | 50.2 | 53.6 | 70.0 | 31.4 | 38.1 | 38.4 | 53.3 |
| Shelly | 39.3 | -- | 43.9 | 58.2 | 47.1 | 64.2 | 28.4 | -- | 39.7 | -- |
| Surpass | 35.6 | 56.6 | 36.7 | 54.1 | 40.7 | 62.7 | 30.1 | 40.5 | 35.8 | 53.5 |
| SY Ingmar | 37.0 | 56.5 | 39.9 | 51.7 | 47.7 | 71.2 | 28.0 | 37.4 | 38.2 | 54.2 |
| SY Rowyn | 29.1 | 53.4 | 33.3 | 52.1 | 46.6 | 65.8 | 28.8 | 36.7 | 34.5 | 52.0 |
| SY Soren | 32.4 | 51.0 | 36.5 | 52.8 | 50.8 | 64.5 | 30.1 | 38.3 | 37.5 | 51.7 |
| SY Valda | 38.7 | 60.2 | 35.1 | 52.1 | 43.7 | 69.7 | 29.3 | 40.7 | 36.7 | -- |
| TCG-Climax | 33.9 | -- | 34.5 | -- | 48.8 | -- | 25.5 | -- | 35.7 | -- |
| TCG-Cornerstone | 36.5 | -- | 32.1 | -- | 44.0 | -- | 26.8 | -- | 34.9 | -- |
| TCG-Spitfire | 35.0 | -- | 37.6 | -- | 64.0 | -- | 29.3 | -- | 41.5 | -- |
| WB9479 | 28.4 | -- | 34.4 | -- | 54.2 | -- | 29.1 | -- | 36.5 | -- |
| WB9590 | 34.3 | -- | 37.6 | -- | 51.6 | -- | 26.3 | -- | 37.5 | -- |
| WB9653 | 37.3 | 56.2 | 39.4 | 54.4 | 47.7 | 69.4 | 31.6 | 42.1 | 39.0 | 55.5 |
| WB9719 | 38.7 | -- | 43.4 | -- | 58.3 | -- | 28.1 | -- | 42.1 | -- |
| WB-Mayville | 37.6 | 54.9 | 32.6 | 46.2 | 49.8 | 61.9 | 24.9 | 37.2 | 36.2 | 50.1 |
| Mean | 34.4 | 53.4 | 36.5 | 52.2 | 48.1 | 66.9 | 28.0 | 37.6 | 36.7 | 52.1 |
| CV % | 11.2 | -- | 11.4 | -- | 12.7 | -- | 10.7 | -- | 10.3 | -- |
| LSD 0.05 | 5.4 | -- | 5.7 | -- | 9.9 | -- | 4.9 | -- | 5.2 | -- |
| LSD 0.10 | 4.5 | -- | 4.8 | -- | 8.3 | -- | 4.1 | -- | 4.1 | -- |

Table 5. Protein at 12 percent moisture of hard red spring wheat varieties grown at nine locations in North Dakota, 2017.

| Variety | Colgate | Carrington | Casselton | Prosper | Dickinson | Hettinger | Langdon | Minot | Williston | State Avg. |
|-----------------|---------|------------|-----------|---------|-----------|-----------|---------|-------|-----------|------------|
| ------(%)----- | | | | | | | | | | |
| AKF-Astro | 13.7 | 13.8 | 12.3 | 12.8 | 14.8 | 11.5 | 12.3 | 14.3 | 17.4 | 13.7 |
| Ambush | 15.5 | 14.6 | 15.0 | 14.7 | 17.1 | 13.7 | 13.8 | 16.1 | 18.8 | 15.5 |
| Barlow | 15.4 | 14.7 | 14.6 | 14.7 | 17.3 | 13.6 | 13.8 | 16.0 | 18.6 | 15.4 |
| Bolles | 16.9 | 16.1 | 16.6 | 16.3 | 18.3 | 15.5 | 15.0 | 17.3 | 19.7 | 17.0 |
| Boost | 15.4 | 15.1 | 15.2 | 14.7 | 17.4 | 14.9 | 13.3 | 16.3 | 18.3 | 15.6 |
| Caliber | 15.7 | 15.6 | 15.4 | 15.4 | 16.8 | 14.1 | 14.7 | 16.1 | 17.7 | 15.7 |
| Elgin-ND | 15.0 | 14.8 | 14.9 | 14.9 | 17.0 | 13.8 | 13.5 | 15.8 | 18.9 | 15.4 |
| Faller | 14.9 | 13.6 | 13.2 | 13.0 | 16.4 | 13.8 | 11.7 | 15.7 | 18.2 | 14.5 |
| Glenn | 15.7 | 14.4 | 15.3 | 14.4 | 17.0 | 14.3 | 14.3 | 16.1 | 18.0 | 15.5 |
| HRS 3100 | 15.1 | 14.7 | 14.5 | 14.0 | 17.1 | 14.1 | 13.0 | 16.8 | 18.3 | 15.3 |
| HRS 3419 | 14.8 | 14.4 | 13.4 | 12.9 | 17.8 | 13.4 | 12.3 | 15.2 | 20.4 | 15.0 |
| HRS 3504 | 14.7 | 15.0 | 14.1 | 14.1 | 16.5 | 14.7 | 12.8 | 16.3 | 17.4 | 15.1 |
| HRS 3530 | 15.6 | 14.7 | 14.4 | 15.0 | 17.7 | 13.9 | 12.7 | 15.7 | 18.9 | 15.4 |
| HRS 3616 | 15.8 | 15.6 | 15.0 | 15.7 | 17.3 | 13.9 | 14.3 | 16.5 | 18.3 | 15.8 |
| Lang-MN | 16.1 | 15.6 | 14.7 | 15.1 | 17.6 | 13.5 | 14.7 | 16.2 | 19.9 | 15.9 |
| LCS Anchor | 15.7 | 15.7 | 14.9 | 14.9 | 16.8 | 13.4 | 13.7 | 15.9 | 17.9 | 15.4 |
| LCS Breakaway | 16.2 | 16.7 | 14.6 | 14.9 | 17.2 | 13.0 | 13.2 | 16.8 | 17.8 | 15.6 |
| LCS Nitro | 14.0 | 13.4 | 13.1 | 13.1 | 16.3 | 13.1 | 11.2 | 14.6 | 17.7 | 14.1 |
| LCS Prime | 13.8 | 13.3 | 13.5 | 13.6 | 15.1 | 13.3 | 11.8 | 14.7 | 16.6 | 14.0 |
| LCS Rebel | 15.3 | 14.9 | 14.8 | 14.4 | 17.6 | 14.4 | 13.5 | 16.3 | 18.9 | 15.6 |
| LCS Trigger | 13.4 | 13.3 | 12.9 | 12.9 | 16.4 | 12.1 | 11.0 | 14.2 | 21.0 | 14.1 |
| Linkert | 16.0 | 16.0 | 14.9 | 15.2 | 18.0 | 13.9 | 14.7 | 16.4 | 18.4 | 15.9 |
| Mott | 15.4 | 15.5 | 14.9 | 14.3 | 17.2 | 14.0 | -- | 16.2 | 19.7 | -- |
| MS Camaro | 15.8 | 15.6 | 14.9 | 14.7 | 17.3 | 13.9 | 13.6 | 16.1 | 17.4 | 15.5 |
| MS Chevelle | 14.5 | 14.5 | 13.7 | 13.8 | 16.3 | 13.1 | 12.2 | 15.2 | 17.0 | 14.5 |
| ND VitPro | 16.0 | 15.3 | 15.6 | 15.5 | 17.5 | 14.8 | 14.2 | 16.6 | 18.0 | 15.9 |
| Prevail | 14.5 | 14.0 | 13.5 | 14.4 | 16.2 | 12.6 | 13.5 | 15.6 | 17.4 | 14.6 |
| Prosper | 14.9 | 13.6 | 14.0 | 13.6 | 15.9 | 12.8 | 11.9 | 15.6 | 18.1 | 14.5 |
| Rollag | 16.3 | 15.8 | 15.3 | 15.0 | 17.4 | 13.3 | 14.4 | 15.8 | 18.3 | 15.7 |
| Shelly | 14.7 | 14.5 | 13.7 | 14.0 | 16.5 | 13.0 | 13.0 | 15.2 | 18.4 | 14.8 |
| Surpass | 14.6 | 15.1 | 14.3 | 14.0 | 16.0 | 13.1 | 12.9 | 15.6 | 17.0 | 14.7 |
| SY Ingmar | 15.6 | 15.5 | 14.8 | 15.1 | 17.3 | 14.4 | 14.1 | 16.3 | 18.8 | 15.8 |
| SY Rowyn | 15.0 | 14.1 | 13.7 | 13.9 | 17.4 | 13.7 | 12.3 | 16.0 | 18.2 | 14.9 |
| SY Soren | 15.6 | 15.7 | 14.7 | 14.9 | 17.5 | 14.1 | 13.6 | 16.1 | 18.5 | 15.6 |
| SY Valda | 15.0 | 14.7 | 13.7 | 13.9 | 16.8 | 13.8 | 12.8 | 15.8 | 18.6 | 15.0 |
| TCG-Climax | 16.7 | 16.3 | 16.0 | 16.1 | 18.2 | 14.8 | 15.1 | 16.6 | 20.7 | 16.7 |
| TCG-Cornerstone | 15.3 | 14.9 | 15.0 | 15.1 | 17.0 | 14.3 | 13.6 | 15.8 | 18.6 | 15.5 |
| TCG-Spitfire | 14.7 | 14.3 | 14.3 | 14.0 | 17.5 | 13.7 | 13.2 | 14.7 | 18.8 | 15.0 |
| WB9479 | 15.9 | 15.8 | 15.9 | 15.0 | 17.4 | 15.0 | 13.9 | 16.2 | 18.0 | 15.9 |
| WB9590 | 15.5 | 15.0 | 14.8 | 15.1 | 17.4 | 14.6 | 13.3 | 16.0 | 17.7 | 15.5 |
| WB9653 | 14.8 | 14.3 | 14.2 | 14.3 | 17.1 | 14.4 | 12.6 | 16.1 | 17.6 | 15.0 |
| WB9719 | 15.2 | 14.5 | 15.0 | 14.7 | 16.4 | 13.5 | 13.1 | 15.3 | 18.2 | 15.1 |
| WB-Mayville | 15.7 | 14.9 | 15.5 | 15.2 | 16.5 | 14.2 | 13.9 | 15.7 | 17.4 | 15.4 |
| Mean | 15.3 | 14.9 | 14.7 | 14.7 | 17.1 | 13.8 | 13.4 | 16.0 | 18.4 | 15.3 |
| CV% | 1.7 | 4.8 | -- | -- | 2.1 | 4.1 | 2.9 | 2.1 | 3.2 | 3.6 |
| LSD 0.05 | 0.4 | 1.0 | -- | -- | 0.7 | 0.8 | 0.5 | 0.5 | 1.0 | 0.4 |
| LSD 0.10 | 0.3 | 0.8 | -- | -- | 0.6 | 0.7 | 0.5 | 0.5 | 0.8 | 0.3 |

Table 6. Test weight of hard red spring wheat varieties grown at eight locations in North Dakota, 2017.

| Variety | Carrington | Casselton | Prosper | Dickinson | Hettinger | Langdon | Minot | Williston | State Avg. |
|-----------------|--------------------|-----------|---------|-----------|-----------|---------|-------|-----------|------------|
| | ------(lb/bu)----- | | | | | | | | |
| AKF-Astro | 55.5 | 58.2 | 59.4 | 60.0 | 61.1 | 54.3 | 58.4 | 48.2 | 56.9 |
| Ambush | 60.0 | 61.9 | 62.2 | 60.3 | 61.6 | 61.5 | 60.5 | 49.5 | 59.7 |
| Barlow | 59.7 | 61.3 | 62.0 | 61.5 | 62.2 | 61.5 | 61.1 | 50.4 | 60.0 |
| Bolles | 58.7 | 60.2 | 60.4 | 57.8 | 59.3 | 61.2 | 58.8 | 50.9 | 58.4 |
| Boost | 58.7 | 61.2 | 60.9 | 59.0 | 59.0 | 60.7 | 59.4 | 49.6 | 58.6 |
| Caliber | 59.1 | 61.1 | 61.5 | 60.9 | 61.6 | 59.8 | 59.2 | 50.8 | 59.3 |
| Elgin-ND | 57.9 | 60.5 | 61.7 | 58.6 | 60.9 | 61.1 | 58.9 | 47.3 | 58.4 |
| Faller | 58.0 | 60.3 | 61.4 | 58.1 | 60.3 | 61.5 | 58.4 | 47.1 | 58.1 |
| Glenn | 61.2 | 63.1 | 63.4 | 61.9 | 60.8 | 63.8 | 60.8 | 52.7 | 61.0 |
| HRS 3100 | 57.4 | 60.6 | 60.4 | 58.9 | 60.6 | 60.1 | 59.7 | 48.4 | 58.3 |
| HRS 3419 | 55.6 | 59.7 | 60.6 | 56.9 | 59.7 | 61.6 | 58.7 | 48.9 | 57.7 |
| HRS 3504 | 56.2 | 60.4 | 59.1 | 59.9 | 61.3 | 59.0 | 59.3 | 48.8 | 58.0 |
| HRS 3530 | 57.4 | 60.5 | 61.4 | 56.9 | 59.8 | 61.3 | 57.7 | 48.1 | 57.9 |
| HRS 3616 | 57.7 | 60.5 | 60.2 | 58.5 | 60.4 | 61.5 | 58.7 | 50.6 | 58.5 |
| Lang-MN | 59.2 | 62.1 | 61.8 | 59.4 | 61.1 | 63.3 | 59.1 | 50.1 | 59.5 |
| LCS Anchor | 59.2 | 61.0 | 59.8 | 60.8 | 61.9 | 61.8 | 61.0 | 51.5 | 59.6 |
| LCS Breakaway | 59.7 | 60.8 | 62.2 | 61.6 | 62.6 | 61.8 | 59.8 | 51.6 | 60.0 |
| LCS Nitro | 56.7 | 58.9 | 61.3 | 57.4 | 59.5 | 62.2 | 57.6 | 50.3 | 58.0 |
| LCS Prime | 60.0 | 61.7 | 62.9 | 61.4 | 63.2 | 61.4 | 60.7 | 51.7 | 60.4 |
| LCS Rebel | 59.7 | 61.7 | 63.0 | 60.5 | 61.9 | 62.4 | 55.7 | 51.4 | 59.5 |
| LCS Trigger | 57.7 | 61.8 | 61.9 | 56.3 | 61.8 | 62.3 | 57.3 | 45.8 | 58.1 |
| Linkert | 58.9 | 59.7 | 61.3 | 60.4 | 62.4 | 60.8 | 61.0 | 50.5 | 59.4 |
| Mott | 57.8 | 60.7 | 60.6 | 58.0 | 60.3 | -- | 58.8 | 49.8 | -- |
| MS Camaro | 59.5 | 61.3 | 61.0 | 60.3 | 60.8 | 61.6 | 59.6 | 52.2 | 59.5 |
| MS Chevelle | 58.6 | 60.8 | 61.0 | 59.9 | 60.9 | 61.3 | 60.2 | 51.1 | 59.2 |
| ND VitPro | 60.0 | 62.1 | 63.0 | 61.6 | 62.1 | 62.7 | 61.2 | 49.7 | 60.3 |
| Prevail | 58.9 | 59.8 | 61.6 | 59.1 | 62.3 | 61.4 | 60.6 | 49.2 | 59.1 |
| Prosper | 58.4 | 60.2 | 61.5 | 58.3 | 60.6 | 60.8 | 59.1 | 47.7 | 58.3 |
| Rollag | 59.1 | 61.2 | 62.3 | 60.1 | 61.1 | 62.4 | 60.2 | 50.0 | 59.6 |
| Shelly | 58.4 | 60.9 | 61.1 | 59.9 | 62.2 | 61.9 | 60.2 | 50.4 | 59.4 |
| Surpass | 58.0 | 59.3 | 60.4 | 60.8 | 61.2 | 60.9 | 60.6 | 49.9 | 58.9 |
| SY Ingmar | 59.6 | 61.8 | 62.0 | 58.3 | 62.0 | 61.1 | 60.5 | 49.2 | 59.3 |
| SY Rowyn | 58.2 | 59.8 | 61.3 | 58.4 | 61.6 | 62.0 | 59.0 | 50.3 | 58.8 |
| SY Soren | 59.3 | 61.2 | 61.7 | 60.5 | 61.4 | 61.3 | 61.0 | 49.8 | 59.5 |
| SY Valda | 58.6 | 60.7 | 62.1 | 59.6 | 61.1 | 60.3 | 58.9 | 49.9 | 58.9 |
| TCG-Climax | 61.0 | 62.4 | 63.2 | 60.1 | 59.9 | 62.8 | 60.6 | 52.5 | 60.3 |
| TCG-Cornerstone | 58.4 | 61.3 | 61.0 | 60.4 | 60.3 | 58.9 | 57.8 | 50.0 | 58.5 |
| TCG-Spitfire | 58.4 | 60.8 | 62.0 | 58.0 | 60.4 | 59.8 | 58.4 | 49.2 | 58.4 |
| WB9479 | 58.5 | 61.8 | 61.8 | 60.6 | 62.3 | 61.0 | 57.7 | 49.9 | 59.2 |
| WB9590 | 57.7 | 60.5 | 61.8 | 60.3 | 61.3 | 60.4 | 59.2 | 49.8 | 58.9 |
| WB9653 | 56.3 | 60.0 | 59.5 | 59.5 | 61.7 | 58.8 | 58.9 | 47.9 | 57.8 |
| WB9719 | 60.7 | 62.0 | 63.5 | 62.3 | 62.3 | 61.9 | 61.5 | 51.2 | 60.7 |
| WB-Mayville | 58.9 | 61.3 | 61.6 | 60.8 | 61.5 | 58.5 | 59.3 | 49.5 | 58.9 |
| Mean | 58.5 | 60.9 | 61.5 | 59.6 | 61.1 | 61.1 | 59.4 | 49.8 | 59.0 |
| CV % | 1.2 | 1.3 | 2.3 | 1.4 | 1.6 | 0.9 | 1.8 | 2.1 | 1.6 |
| LSD 0.05 | 1.0 | 1.0 | 1.8 | 1.1 | 1.4 | 0.8 | 1.5 | 1.7 | 0.8 |
| LSD 0.10 | 0.8 | 0.8 | 1.4 | 1.0 | 1.1 | 0.7 | 1.5 | 1.4 | 0.7 |

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